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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/581,939

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Reinhold Meier

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Davidson, Davidson & Kappel, LLC  
485 7th Avenue  
14th Floor  
New York, NY 10018

EXAMINER

AFZALI, SARANG

ART UNIT

PAPER NUMBER

3726

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/581,939	<b>Applicant(s)</b> MEIER ET AL.	
	<b>Examiner</b> SARANG AFZALI	<b>Art Unit</b> 3726	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on Amendment filed 12/11/2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 24-37 is/are pending in the application.
- 4a) Of the above claim(s) 33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 24-32 and 34-37 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 June 2006 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                    | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's response filed on 12/11/2009 has been fully considered and made of record.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 24-29 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thore (US 5,511,949) in view of Worz et al. (US 5,393,485).
4. As applied to claims 24-29 and 36, Thore teaches a method of fixedly joining a plurality of hollow gas turbine blades including a closed and supporting exterior wall (13, Fig. 2) with a cast rotor carrier (disk 11) by employing a welding process (col. 3, lines 6-14) but does not explicitly teach the detailed claim steps of providing, mixing, compacting, foaming and cooling (claim 24), metal powder and foaming agent materials (claims 25 & 26) and extrusion process for compacting (claim 27), plurality of metal powders with different melting points and granularities (claims 28 & 29) to form the turbine blades.

However, Worz et al. teach a method for manufacturing a component comprising: providing at least one metal powder and at least one foaming agent; mixing the at least

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one metal powder (aluminum, col. 3, line 33) including a plurality of metal powders each of the plurality of metal powders having different melting points and powder granularities (col. 3, lines 62-64, col. 4, lines 3-5 & 27) with the at least one foaming agent (titanium hydride, col. 3, lines 33-34), compacting (by extrusion) the resulting mixture to form at least one precursor; and foaming the at least one precursor by heating the at least one precursor in a mold until a defined degree of foaming is reached; cooling the at least one precursor when the defined degree of foaming is reached to terminate the foaming . the cooled at least one precursor being at least a component having a closed and supporting exterior wall (Abstract, lines 1-15, Fig. 1, note the component exiting the apparatus is a closed component with top and bottom surfaces/walls).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have formed the blades of Thore in light of the teachings of Worz et al. since such method would provide an efficient means of producing a cost effective, lightweight and strong turbine blade with interior cavities that would effectively withstand the harsh operating environments of high stress and high temperature.

5. Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thore in view of Worz et al. as applied to claim 24 above, and further in view of Danforth et al. (US 5,900,207).

Thore/Worz et al. teach the invention cited with the exception of explicitly teaching that the metal powder and foaming agent are mixed with a material selected from ceramic particles, fibers and combinations.

However, Danforth et al. teach that it is well-known in the art of gas turbine manufacturing to make a turbine component (i.e. blades, seals, col. 4, lines 52-54) by extruding a mixture of metal and ceramic materials (col. 13, lines 46-57).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have provided the mixture of Thore/Worz et al. with ceramic particles as taught by Danforth et al. as an effective means of producing a turbine component from different materials each displaying a different property with desired characteristic.

6. Claims 31, 32, 34 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thor/Worz et al. as applied to claim 24 above, and further in view of Grylls et al. (US 6,648,596).

7. As applied to claim 31, Thore/Worz et al. teach the invention cited with the exception of explicitly teaching that a supporting and/or function-relevant component made of a non-foamable material is at least partially surrounded by foam or partially embedded in foam during the foaming step.

However, Grylls et al. teach a method of making a turbine engine blade (Abstract, lines 1-8) wherein a metallic non-foam region (22, Fig. 4) is surrounded by the ceramic foam region (24, col. 4, lines 7-10).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have provided the mixture of Thore/Worz et al. with a non-foamed supporting component surrounding the foamable material resulting in a turbine

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component with composite construction that is as light in weight as possible and displays property requirements that vary substantially at different locations and that can operate at elevated temperatures (col. 1, lines 62-67).

8. As applied to claim 32, Thore/Worz et al./Grylls et al. teach the invention cited with the exception of explicitly teaching that the one precursor to be foamed and the non-foamed component are made from same material.

However, at the time of the invention, it would have been an obvious matter of design choice to a person of ordinary skill in the art, to have used a similar material for the precursor to be foamed and the component made of a non-foamed material partially embedded in the foam material because applicant has not disclosed that only the claimed same material used as foamed and non-foamed components provide any advantages, are used for particular purposes, or solve stated problems. One of ordinary skill in the art, furthermore, would have expected applicant's invention to perform equally well with materials used as the foamed and non-foamed components of Thore/Worz et al./Grylls et al. because either one performs the same function of providing a strong and corrosion resistant gas turbine component that functions well at high temperatures and under other harsh operating conditions.

In addition, note that Applicant discloses (Specification, paragraph [0029]) different embodiments wherein the materials of the foamed and no-foamed components could be either the same or different.

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9. As applied to claim 34, Thore/Worz et al./Grylls et al. teach the invention cited. Grylls et al. further teach that the turbine blade may include a metallic nonfoam region where required for strength and ductility, typically in the attachment (i.e. root region) and the ceramic foam region that has high-temperature shape-retention capability but is not as strong and ductile as the metallic nonfoam region (col. 3, lines 4-8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have provided the blade of Thore/Worz et al. with a non-foamable material (such as metal) in certain regions (attachment/root region) in light of the teachings of Grylls et al. as an effective means of providing extra strength and ductility to the root areas of the blades to better withstand high stress and loads.

10. As applied to claim 37, Thore/Worz et al. teach the invention cited with the exception of explicitly teaching that subsequent to the cooling step, a surface of the gas turbine component is coated.

However, Grylls et al. teach a method of making a turbine engine blade (Abstract, lines 1-8) wherein a metallic non-foam region (22, Fig. 4) is surrounded by the ceramic foam region (24, col. 4, lines 7-10) and that subsequent to the step of cooling/forming the foaming component (24), a coating (50) is applied to the surface of the blade component (foamed region 24) to protect the intracellular metal from outside environment and/or serve as a thermal barrier coating (paragraph bridging cols. 7 & 8).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have provided the blade component of the Thore/Worz et al. with a

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coating layer in light of the teachings of Grylls in order to provide an effective protective layer on outer surface of the blade component.

11. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Thore in view of Worz et al. and Grylls et al. as applied to claim 31 above, and further in view of Simon (US 6,827,556).

Thore/Worz et al./Grylls et al. teach the invention cited with the exception of explicitly teaching that the foamed precursor includes at least one flow channel.

However, Simon teaches a method of making a turbine engine component (Figs. 2-4, Abstract, lines 1-8) wherein the at least one gas turbine component includes a blade (1, Fig. 2) and wherein the at least one precursor is foamed (5) in a mold with a with at least one integrated flow channel (29, , 29A, 29B, Fig. 4), at least one component forming the flow channel being surrounded by foam during the foaming process.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have provided the foamed blade component of the Thore/Worz et al./Grylls et al. with a integrated flow channel surrounded by the foam in order to provide effective means of cooling the interior of the blades subjected to high operating temperatures.

### ***Response to Arguments***

Applicant's arguments filed 12/11/2009 have been fully considered but they are not persuasive.

Applicant's amendment to the title is accepted and as such, the objection to the specification is withdrawn.

Applicant mainly argues (Remarks, paragraph bridging pages 1 & 2) that the secondary reference Worze does not teach or disclose "the cooled at least one precursor being at least one gas turbine component having a closed and supporting exterior wall" as claimed in claim 24. Therefore, the Applicant requests the withdrawal of the rejection of claims 24-32 and 34 to 37 which all depend on the teachings of Worze reference.

The Examiner respectfully disagrees with the above argument. Note that the primary reference Thore teaches a method of fixedly joining a plurality of hollow gas turbine blades having a closed and supporting exterior wall (Fig. 2) with a cast rotor carrier by a welding process.

Considering the broadest reasonable claim interpretation, the limitation of "closed and supporting exterior wall" can also be met with a component made of a solid cross section such as one taught by Worze. Furthermore, if the Applicant's intention is to claim a component (as shown in Fig. 6 of the Applicant's Drawings) wherein there are hollow section (46) within the component, and the claims are amended to recite such an embodiment, even then it would have been obvious to one of ordinary skill in the art to

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have provided the apparatus (1) of the Warz with a desired extrusion die (13) that would result in a desired shaped components with or without any internal cavities.

It is noted that Warz (col. 4, lines 12-31) teaches different embodiments wherein other apparatuses which are different than the disclosed device (1) may be used to practice its method of extruding foamable metal elements made from the disclosed powder materials to form a metal foam element of any prior art components.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to SARANG AFZALI whose telephone number is (571)272-8412. The examiner can normally be reached on 7:00-3:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Bryant can be reached on (571) 272-4526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SARANG AFZALI/  
Examiner, Art Unit 3726  
3/26/2010

/DAVID P. BRYANT/  
Supervisory Patent Examiner, Art Unit 3726